Railway Track Geometry - BMEEOUVDT82

I. Subject Specification

1. Basic Data

1.1 Title

Railway Track Geometry

1.2 Code

BMEEOUVDT82

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Dr. Liegner Nándor
academic rank	Associate professor
email	liegner.nandor@emk.bme.hu

1.8 Department

Department of Highway and Railway Engineering

1.9 Website

https://epito.bme.hu/BMEEOUVDT82
https://fiek2.mywire.org/course/view.php?id=2568

1.10 Language of instruction

english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

1 September 2022

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2. Objectives and learning outcomes

2.1 Objectives

The aim of the course is for the student to model the theoretical and practical requirements of railway track geometry. Get to know the theory of differential geometry, the natural triedron, their derivatives, movement characteristics, speed, acceleration, changing of acceleration and their derivation in respect of length of arc and time. Be able to determine the details of the transition geometry, apply the transition geometry of cant. Types of transition curves, vertical transition curves. Cant deficiency, cant excess, effect of body tilt coaches on cant deficiency. Familiar with the relevant standards of design of railway track geometry with continuous change and that with abrupt change of curvature. Analise the need to build a transition curve and cant. Familiarize with the theory required to geometrical calculation of the switches and crossings.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. has relevant knowledge of differential geometry,
2. knows the mathematical basics of movement characteristic,
3. knows the application of movement characteristic,
4. knows the theory of transition geometry of curvature,
5. knows the theory of transition of cant,
6. can apply and supervise the rules of relevant standards,
7. knows how to analyze continuous change and abrupt change of curvature,
8. knows the theory of calculation of switches, crossings and individual track connections.

B. Skills

1. able to derive and calculate movement characteristics,
2. suitable for the geometrical calculation of the details of any geometry of curvature transition,
3. suitable for the geometrical calculation of the details of any transition of cant,
4. able to model the geometry of curvature transition,
5. able to model transition of cant, cant deficiency, cant excess, effect of body tilt coaches on cant deficiency,
6. be able to determine the need to apply a curvature transit and transition of cant,
7. able to analyze the geometrical properties of turnouts, crossings and any types of track connections on the basis of movement characteristics.

C. Attitudes

1. cooperates with the teacher and fellow students in expanding the knowledge,
2. expands his knowledge with continuous acquisition of knowledge,

3. open to the use of information technology tools,
4. strives to know and routinely use the tools needed to solve problems,
5. strives for an accurate and error-free solution.

D. Autonomy and Responsibility

1. independently considers the planning tasks and problems of the railway line and solves them on the basis of research capabilities,
2. openly welcomes substantiated critical remarks,
3. cooperates with research fellows in solving tasks,
4. takes a systematic approach to its thinking.

2.3 Methods

Lectures, computational exercises, written and oral communication, use of IT tools and techniques, optional independent assignments, work organization techniques.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	Mathematical basis of differential geometry, natural triedron, derivation of movement characteristics, speed, acceleration, changing of acceleration
2.	Determination of practical formulae of movement characterisitcs
3.	Geometry of curvature transition in case of linear, cosine, sine, fourth power parabolic and Wiener Bogen transition curves, part I.
4.	Geometry of curvature transition in case of linear, cosine, sine, fourth power parabolic and Wiener Bogen transition curves, part II.
5.	Geometry of curvature transition in case of linear, cosine, sine, fourth power parabolic and Wiener Bogen transition curves, part III.
6.	Effect of cant, cant deficiency, cant excess, types of cant transition, part I.
7.	Cant transitions, part II.
8.	Determination of the length of the transition curves.
9.	Review of existing standards of design of geometrical alignment of railway tracks and that of cant.
10.	Assessment of the need of transition curves and / or transition of cant.
11.	Effect of body tilt coaches on cant deficiency and track alignment.
12.	Evaluation of swithces, crossings and track connections on basis of movement characteristics, part I.
13.	Evaluation of swithces, crossings and track connections on basis of movement characteristics, part II.

14.	Consultation

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

Dr. Jenő Megyeri: Railway Motion Geometry, Technical Publishing House, Budapest, 1986

2.6 Other information

2.7 Consultation

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes set out in point 1 is based on a written exam at the end of the semester.

3.2 Assessment methods

Teljesítményértékelés neve (típus)	Jele	Értékelt tanulási eredmények
Written exam (summary performance evaluation)	E	A.1-A.8; B.1-B.7

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Jele	Részarány
E	100
Összesen	**100%**

3.4 Requirements and validity of signature

3.5 Grading system

Grade	Score (P)
excellent (5)	87.5 <= P
good (4)	75 <= P <87.5%
satisfactory (3)	62.5 <= P <75%
pass (2)	50 <= P <62.5%
fail (1)	P <50%

3.6 Retake and repeat

3.7 Estimated workload

Activity	Hours/semester
participation in contact classes	14×3=42
preparation for the classes	14
exam preparation	34
Sum	**90**

3.8 Effective date

1 September 2022

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